

Appl. No. 10/702,442
Amendment dated: August 15, 2006
Reply to OA of: May 15, 2006

REMARKS

This is in response to the Official Action of May 15, 2006 in connection with the above-identified application. Applicants have amended the claims in order to more precisely define the scope of the present invention, taking into consideration that outstanding Official Action.

Specifically, claim 1 has been amended to recite that the liquid comprises ozone water, the gas comprises a gas mixture comprising ozone, and the substance comprises a photoresist. This amendment is clearly supported by the specification as originally filed, including, e.g., original claims 3, 7 and 8. In light of the amendment to claim 1, Applicants have also amended claim 3 to delete the limitation "wherein the substance is a photoresist or an organic containment on the surface of the water" and canceled claims 7-9. The claims and subject matter have been canceled without prejudice or disclaimer and Applicants reserve the right to file a continuation application or continuation applications directed to the canceled subject matter. Applicants respectfully submit that all claims now pending in the instant application are in full compliance with the requirements of the 35 U.S.C. §112 and are patentable over the references of record.

The rejection of claims 1-3, 5 and 7-9 under 35 U.S.C. §103(a) as being unpatentable over Degendt et al. (US Pub. No. 2002/0011257) in view of Muraoka et al. (US Pat. No. 6,696,228) as evidenced by Kashiwase et al. (US Pat. No. 5,378,317) has been carefully considered but is most respectfully traversed in light of the amendments to the claims and the following comments.

Applicants wish to direct the Examiner's attention to the basic requirements of a prima facie case of obviousness as set forth in the MPEP § 2143. This section states that to establish a prima facie case of obviousness, three basic criteria first must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a

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reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Section 2143.03 states that all claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

The Official Action begins by urging that the declaration under 37 CFR §1.132, filed April 10, 2006, is insufficient to overcome the §103(a) rejection of the claims as set forth in the previous Official Action because the limitations stated in the declaration are not recited in the claims. The Official Action expressly notes that while the declaration is drawn to using ozone water to strip photoresist, the claims recite photoresist or an organic contaminant (claim 3) and pure water or ozone water (claim 8). Accordingly, Applicants have amended claim 1 as described above such that the claims of the instant application are commensurate in scope to the declaration filed April 10, 2006. In other words, the claims of the instant application now mirror the conditions of the experiments described in the declaration.

As such, Applicants respectfully submit that the declaration filed April 10, 2006, serves as evidence showing greater than expected results that rebuts the alleged *prima facie* case of obviousness over the Degenhardt reference as set forth in the previous Official Action and as repeated in the present Official Action. "A greater than expected result is an evidentiary factor pertinent to the legal conclusion of obviousness ... of the claims at issue." *In re Corkill*, 711 F.2d 1496, 226 USPQ 1005 (Fed. Cir. 1985). **Evidence of a greater than expected result may be shown by demonstrating an effect which is greater than the sum of each of the effects taken separately (i.e.,**

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demonstrating “synergism”). *Merck & Co. Inc. v. Biocraft Laboratories Inc.*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), *cert. denied*, 493 U.S. 975 (1989)(emphasis added).

The enclosed Declaration is made by Ms. Chiou-Mei Chen who has a Masters degree in environmental engineering and is an employee of Industrial Technology Research Institute. The experiments conducted by Ms. Chen were all conducted by Ms. Chen alone or Ms. Chen and her associates together.

As can be seen from the results summarized in Table 1, under substantially similar experimental conditions, the stripping rate in angstroms/minute for the method as claimed in the present invention (i.e., partially immersed wafers wherein the substance is photoresist and the liquid is ozone water) is more than 4 times the stripping rate of the wafers held above the water and more than 28 times the stripping rate of the wafers completely immersed in the liquid. The stripping rate of the method as claimed in the present invention is more than 3.5 times the stripping rate of the sum of the stripping rates of Group I and Group II. Applicants respectfully submit that this is a clear case of “synergism” referred to in *Merck & Co. Inc.* and serves as evidence of nonobviousness to overcome the §103(a) rejection set forth in the Official Action.

As can be seen from the results summarized in Table 2, under substantially similar experimental conditions, the stripping rate in angstroms/minute for the method as claimed in the present invention (i.e., partially immersed wafers wherein the substance is photoresist and the liquid is ozone water) is almost 6 times the stripping rate of the wafers held above the water and more than 35 times the stripping rate of the wafers completely immersed in the liquid. The stripping rate of the method as claimed in the present invention is almost 5 times the stripping rate of the sum of the stripping rates of Group I and Group II. Again, Applicants respectfully submit that this is a clear case of “synergism” referred to in *Merck & Co. Inc.* and serves as evidence of nonobviousness to overcome the §103(a) rejection set forth in the Official Action.

The Official Action notes in addressing the declaration that “applicant’s [37] CFR 1.132 [declaration] clearly shows that Groups II, III, and I are capable of stripping the photoresist and the prior art teaches stripping the photoresist.” Applicants fail to

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understand the significance of this statement. Applicants are not alleging that fully immersed wafers (Group III) or fully suspended wafers (Group I) are incapable of stripping photoresist from the wafers. However, Applicants do assert that, in light of the synergistic effect achieved by the claimed invention (i.e., partial immersion of the wafers) and demonstrated by the results of the experiments summarized in the declaration, it would not be obvious from the teaching in Degendt of full immersion and full suspension to modify the disclosed invention to partial immersion as alleged in the Official Action.

Ultimately, the results of the experiment summarized in Table 1 and Table 2 clearly show that the presently claimed method demonstrates an effect that is much greater than the sum of each of the effects taken separately, and therefore demonstrates "synergism". Moreover, these results are clearly greater than those which would have been expected from the prior art to an unobvious extent since the claimed method shows, at a minimum, a 3.5 fold increase over the sum of the results achieved by the prior art methods. There is no disclosure in the prior art that such a result should be expected from a combination of the two methods. Finally, Applicants respectfully submit that the results set forth in the Declaration are of a significant and practical advantage over the prior art, as the residue can be stripped from the substrates at a substantially faster rate, thereby increasing productivity and reducing production costs.

Thus, in light of the declaration and the clear showing of greater than expected results, Applicants respectfully submit that an allegation of obviousness, such as the §103(a) rejection over Degendt set forth in the outstanding Official Action, has been rebutted and overcome. That is to say, regardless of whether the Official Action has established a proper §103(a) rejection according to the guidelines set forth in MPEP §2143, any *prima facie* case of obviousness has been rebutted due to the greater than expected results achieved by the claimed invention and the burden has been shifted back to the Examiner to show how the claimed invention is unpatentable. Accordingly,

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Applicants respectfully request that the §103(a) rejection of the instant claims be withdrawn.

Turning now to the actual text of the §103(a) rejection over Degendt, the Official Action urges that Degendt discloses a method for treating a surface of a substrate wherein bubbles may work to strip a substance from the surface of the substrate. The Official Action further notes that Degendt discloses that the substrate may be completely immersed in the liquid or may be suspended above the liquid such that no part of the substrate is immersed in the liquid. The Official Action implicitly acknowledges that Degendt fails to disclose a method wherein the bottom portion of the substrate is immersed in the liquid but the top portion is not immersed in the liquid.

However, the Official Action urges that it would have been obvious to one of ordinary skill in the art to use the combination thereof such that the substrate is only partially immersed in the liquid “because both of which have been used and be able to remove the resist and residues”. It appears that the Official Action cites “the nature of the problem to be solved” as the motivation to combine the references. Applicants respectfully traverse these statements.

As discussed in the previous response, Applicants note that Degendt discloses two wholly separate methods of stripping a residue from a substrate. As clearly described in the reference, the first method disclosed in Degendt involves placing wafers above the solution interface but not immersing the substrate. The substrate is exposed to a moist ozone ambient and processed for a sufficient period of time (see paragraphs [0086]-[0089]). Alternatively, Degendt discloses a second method wherein the substrates are completely immersed in the liquid and bubbles contact the surface to strip residue from the surface (see paragraphs [0092]-[0093]). What Degendt does not disclose or suggest is using both of these methods simultaneously. Throughout Degendt, the two different methods are separately discussed, and Degendt never discloses performing the two methods at the same time. This is because Degendt discloses two different methods, not two different steps of a single method.

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Thus, Applicants respectfully submit that regardless of the fact that each method addresses the same problem, it would not be obvious to use the two different methods at the same time. An argument could perhaps be made that because both methods address the same problem it would be obvious to use the two methods sequentially (i.e., begin by fully suspending the wafer and then fully immerse the wafer), but there is no motivation or suggestion in the references for partial immersion when considering the two separate methods disclosed in Degendt. Accordingly, Applicants respectfully submit that a proper §103(a) rejection according to the guidelines set forth in MPEP §2143 has not been established and the rejection should therefore be withdrawn.

Finally, Applicants note that there is no disclosure of bubbles ascending along the surface of the substrate including above the horizon of the liquid. Clearly, in the method of Degendt wherein a single wafer is fully immersed, there can be no ascension of bubbles above the horizon of the liquid because no portion of the substrate is above the liquid. With respect to the single wafer being suspended above the liquid, the Degendt reference discloses exposing the wafer to a moist O₃ ambient (see, e.g., paragraph [0093]). Applicants respectfully submit that this disclosure falls short of disclosing bubbles ascending along the surface of the substrate. Exposure to a moist O₃ ambient suggests contact with the wafer, but not bubbles ascending along the substrate. Thus, neither method discussed in Degendt discloses bubbles ascending along the substrate as claimed in the instant application.

Further, because it would not be obvious to combine the two methods of Degendt such that the wafer is partially immersed as discussed in detail above, the Official Action's assertion that it is expected that gas bubbles would ascend along the surface of the substrate is moot. That is to say, because there is no disclosure or suggestion in the prior art of the partially immersed wafers claimed in the instant application, the assertion in the Office Action that bubbles ascending along the wafer would be expected from this configuration is of no consequence. Unless there is additional prior art suggesting this limitation of bubbles ascending along the surface of the substrate, the reasoning set forth in the Official Action that it is expected that the

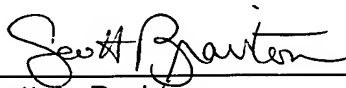
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gas bubbles would ascend along the surface of the substrate lacks basis and support. In order for bubbles to ascend along the surface of the substrate, the presently claimed invention uses a plurality of parallel substrates equidistantly arranged above the aerating device. DegenDt does not disclose this configuration, and therefore DegenDt does not disclose the factors affecting whether bubbles ascend along the surface of the substrate, including the substrate above the horizon of the liquid. Thus, based on the DegenDt reference, Applicants fail to see how a teaching of a singly fully suspended or fully immersed wafer would lead one of ordinary skill in the art to develop a plurality of parallel substrates partially immersed, wherein bubbles ascend along the surface of the substrate as claimed in the instant application.

Accordingly, Applicants respectfully submit that none of the prior art references cited in the Official Action, either standing alone or in combination, disclose or suggest every element of the claimed invention. Therefore, a proper §103(a) rejection according to the guidelines set forth in MPEP §2143 has not been established and should be withdrawn.

In view of the above comments and further amendments to the claims, favorable reconsideration and allowance of all of the claims now present in the application are most respectfully requested.

Respectfully submitted,
BACON & THOMAS, PLLC

By: 

Scott A. Brairton
Registration No. 55,020

625 Slaters Lane, 4th Fl.
Alexandria, Virginia 22314
Phone: (703) 683-0500
Facsimile: (703) 683-1080
SAB:cmd
A03.wpd

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